Guaranteeing Deterministic End-to-End Delay

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Introduction

- **Backgrounds**
  - **There is going to have a consensus solution on ResE.**
- **Message**
  - **Any architectural concept for a proposal on Residential Ethernet should guarantee deterministic end-to-end delay.**
  - **If could not make sure with any dynamic resource control, static bandwidth reservation might be a possible solution.**
- **Focus on**
  - **Goals to achieve in Residential Ethernet with paying**
  - **Can get deterministic delay without doubt ?**
  - **Why not static bandwidth reservation ?**

Goals to achieve in Residential Ethernet

- **Deterministic latency & low jitter**
  - **no frame loss**
  - **deterministic latency in queues under any circumstances**

- **Approach in RESG**
  - **synchronized cycle**
  - **forward frames based on cycle**
  - **reserve bandwidth**
  - **signaling for resource control**
  - **monitoring, shaping, and discarding frames**

Pay for achieving goals

- **New function modules**
  - **Local clock synchronization**
  - **Queue & scheduling for isochronous channel**
  - **Signaling module**
  - **State management**
- **Controversy**
  - **Complexity, costs**
  - **Interoperability**

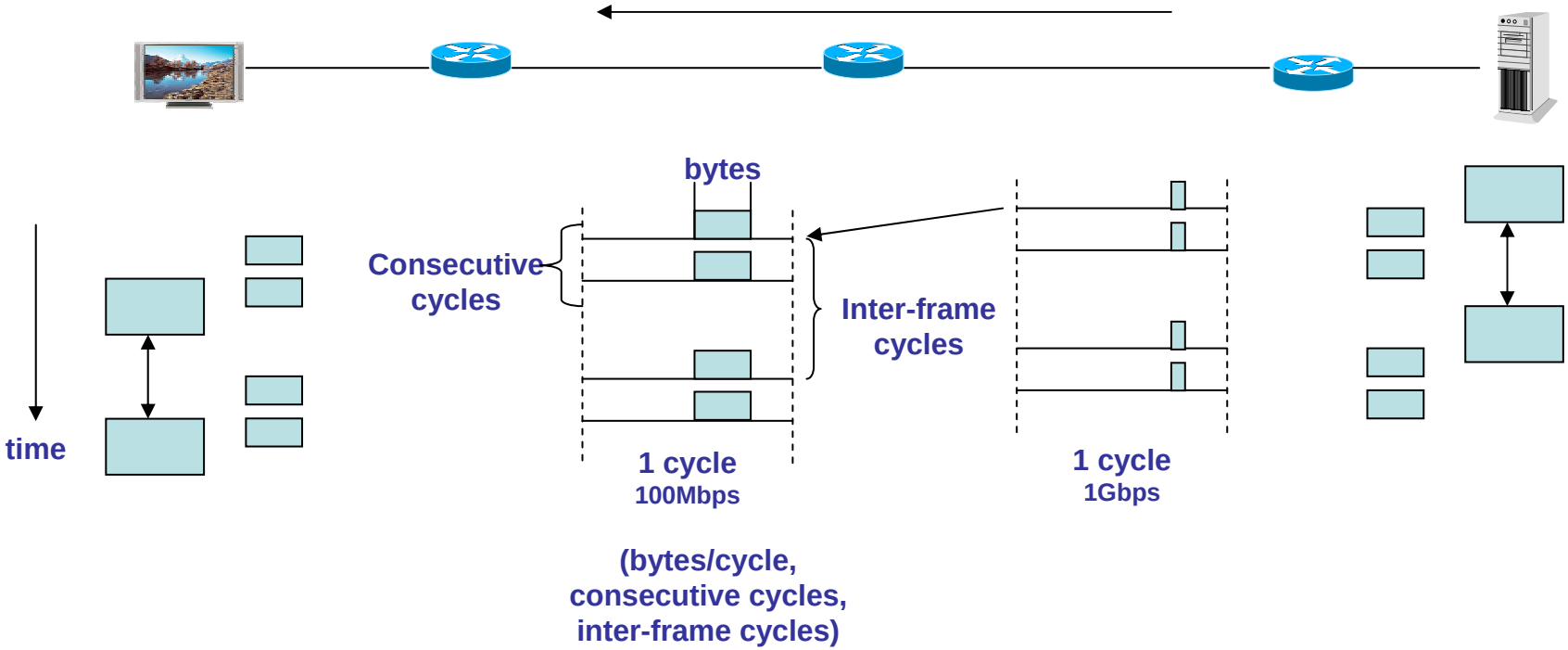
Achieving deterministic latency

- **Realities**
  - **Self-similar traffic**
    - **size of packets in TCP flows**
    - **burstness**
  - **To maximize link utilization**
    - **unused bandwidth**
    - **statistical multiplexing**

- **Deterministic latency in queue**
  - **Find an equilibrium point, whenever situation changed**
  - **Focus on services which keep away from two constraints**
    - **Constant bit rate services (audio, uncompressed video, …)**

Synchronous cycle from end-to-end

- **Preserve application frames' inter-arrival time at end-to-end**
- **Guarantee bytes/cycle, consecutive cycles, inter-frame cycles**



Guaranteeing deterministic E2E latency

- **Deterministic processing of frames**
  - **Reserve peak bandwidth**
    - **Assign bytes on periodical consecutive cycles**
    - **Guarantee**
  - **Not queuing, 1 cycle preemptive buffering**
  - **No shaping, cut-through forwarding**

- **Proposal**
  - **Assign a class for this kind of services**

Conclusions

- **It would be unable to avoid adding new features on legacy Ethernet to support deterministic end-to-end latency.**
- **Residential Ethernet, bandwidth controlled in synchronized cycle, will be operated in a simple manner for supporting services which generate constant-bit-rate frames arrived uniformly.**
- **It is suggested to let ResE manage such kind of services separately.**

Thanks for your attention !!

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